

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of )  
Jin-ho LEE et al. ) Group Art Unit: Unassigned  
Application No.: Unassigned ) Examiner: Unassigned  
Filed: June 5, 2001 )  
For: MICRO-ACTUATOR AND )  
MANUFACTURING METHOD )  
THEREOF )

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Please preliminarily amend the application, as follows:

**IN THE CLAIMS:**

Please amend claims 5, 7, 8, 10, 15, 17 and 18, as follows:

5. The micro-actuator of claim 1, wherein

the fixed comb-type electrodes are formed on an electrode base that is arranged on the base plate, and

the electrode base, the fixed comb-type electrodes and the second frame layer are formed of the same material plate.

7. The micro-actuator of claim 1, wherein the height of the fixed comb-type electrodes is greater than that of the second frame layer, and thus the front ends of the fixed comb-type electrodes are positioned higher than the top of the second frame layer.

8. The micro-actuator of claim 1, wherein the front ends of the driving comb-type electrodes and the first frame layer are on a common plane.

10. The micro-actuator of claim 1, wherein the metal eutectic bonding layer of the present invention is composed of a plurality of metal layers, among which the middle metal layer is plated with Au/Sn alloy.

15. The method for manufacturing a micro-actuator of claim 12, wherein the step of forming the top metal layer further comprises the steps of  
forming a metal seed layer on the bottom of the first plate; and  
forming a metal eutectic bonding layer by a plating method on the seed layer.

17. The method for manufacturing a micro-actuator of claim 13, wherein the step of forming a bottom metal layer on the second frame layer of the bottom structure further comprises a step of performing the metal eutectic bonding at a predetermined temperature and pressure in order to join the first frame layer of the top structure to the second frame layer of the bottom structure, and more specifically to join the top metal layer of the first frame layer of the top structure to the bottom metal layer of the second frame layer of the bottom structure.

18. The method for manufacturing a micro-actuator of claim 11, wherein the bottom of the second plate is joined to the top of the base plate by an anodic bonding process.

#### **REMARKS**

Claims 5, 7, 8, 10, 15, 17 and 18 have been amended to remove the multiple dependency.

Favorable action on the merits is respectfully requested.

Respectfully submitted,

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**Appended Claims**

5. (Amended) The micro-actuator of [any of claims 1-4] claim 1, wherein the fixed comb-type electrodes are formed on an electrode base that is arranged on the base plate, and

the electrode base, the fixed comb-type electrodes and the second frame layer are formed of the same material plate.

7. The micro-actuator of [any of claims 1-4] claim 1, wherein the height of the fixed comb-type electrodes is greater than that of the second frame layer, and thus the front ends of the fixed comb-type electrodes are positioned higher than the top of the second frame layer.

8. The micro-actuator of [any of claims 1-4, and 6] claim 1, wherein the front ends of the driving comb-type electrodes and the first frame layer are on a common plane.

10. The micro-actuator of [any of claims 1-4, 6, and 9] claim 1, wherein the metal eutectic bonding layer of the present invention is composed of a plurality of metal layers, among which the middle metal layer is plated with Au/Sn alloy.

15. The method for manufacturing a micro-actuator of [claims 12 or 14] claim 12, wherein the step of forming the top metal layer further comprises the steps of forming a metal seed layer on the bottom of the first plate; and forming a metal eutectic bonding layer by a plating method on the seed layer.

17. The method for manufacturing a micro-actuator of [claims 13 or 14] claim 13, wherein the step of forming a bottom metal layer on the second frame layer of the bottom structure further comprises a step of performing the metal eutectic bonding at a predetermined temperature and pressure in order to join the first frame layer of the top structure to the second frame layer of the bottom structure, and more specifically to join the top metal layer of the first frame layer of the top structure to the bottom metal layer of the second frame layer of the bottom structure.

18. The method for manufacturing a micro-actuator of [any of claims 11-16] claim 11, wherein the bottom of the second plate is joined to the top of the base plate by an anodic bonding process.

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